

Economic Botanical Notes on Edible Canna (Cannaceae) in South Vietnam

Nobuyuki TANAKA

Makino Herbarium, Graduate School of Science, Tokyo Metropolitan University,
Minamiosawa 1-1, Hachiouji, Tokyo, 192-0364 JAPAN

(Received on March 30, 1998)

In the course of my taxonomical work of the family Cannaceae, an economic botanical survey of the edible canna plants (*Canna edulis* Ker Gawl. and its allies) was carried out to investigate its identity, properties and utilization in south Vietnam. Besides the utilization of cooked rhizomes for their own consumption by local people, starch extracted from rhizomes is used to produce noodle which was sometimes found at the market. In Vietnam, thus, edible canna is of commercial value and can provide an applicable cash income to small and poor villagers. The edible canna plants cultivated in the area covered by the present study were found to be a single species, *C. discolor* Lindl. A field investigation also suggests that this species does not coincide at all with *C. edulis* though it has been so identified for a long time.

The family Cannaceae with a single genus *Canna* consists of robust, rhizomatous, perennial herbs, most of which are indigenous to tropical America. Several taxa are, however, spreading also into the Old World tropics and subtropics, where they have been apparently differentiating into local taxa in some cases. In Japan *Canna indica* L. and the yellow flower variety are naturalized in the Ryukyu Islands (Tanaka 1998).

Both the positive fact of a South American center of *Canna* speciation and the negative fact of the total lack of archaeological *Canna* materials from Mesoamerica indicate for edible canna a South American origin (Gade 1966).

The utilization of rhizomes of some canna species, *C. edulis* Ker Gawl. and its allies, has a long history in South America. Archaeological material has been excavated by Bird (1948) at Hucca Prieta on the Peruvian coast in

preceramic levels dated about 2500 B.C. before the introduction of maize and cassava (Gade 1966, Purseglove 1972). Moreover, Ugent et al. (1984) reported other new archaeological evidence on ancient cultivation in Peru.

A traditional Andean feast is baked canna, roast guinea pig, yacon (*Polymnia sonchifolia* Poepp. & Endl.) and quinoa (*Chenopodium quinoa* Willd.) beer (The National Research Council 1989). According to Duck and Vasquez (1994), in Amazonian region, the rhizome of *Canna indica* L. is used in soups for children and the sickly. In El Salvador, the rhizomes are also used in soup. The leaves and raw tubers are fed to pigs (Morton, 1981). In Indonesia edible canna is frequently cultivated for its rhizomes by the native in Java on their premise. Sometimes they are used for preparation of meal, a kind of arrowroot (Ochse and van den Brink 1977). The starch has been extracted

and eaten in West Africa (Burkill 1985).

As pointed out by the National Research Council (1989), the starch of canna plant has the largest granular size and enzymatic digestibility. Moreover the leaves and stems can be fed to livestocks, however, edible canna has been so neglected by scientists that everything remains to be done, from assessment to genetic improvement. Therefore researchers should gather experiences of various parts of the Andes, Taiwan, Indonesia, Madagascar, Burma and the other areas.

In the course of the taxonomical work of the Cannaceae, a botanical survey of Cannaceae in south Vietnam was conducted from August to September in 1996. This article is a brief report on economic botanical aspects of canna plants in Vietnam.

Field work

The main purpose of this field study was to make an economic botanical survey of the edible canna plants used by the local residents in south Vietnam. The identity, properties and utilization were examined. The approximate routes of this expedition were given in Fig. 1.

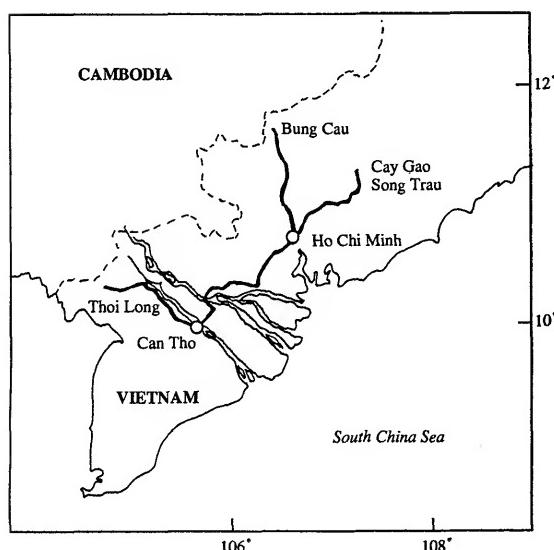


Fig. 1. Approximate routes of the trip (—).

As the results of the market research in Ho Chi Minh and Can Tho conducted in order to search for canna cultivation, interviews with several different people in four different traditional villages where edible canna is frequently cultivated, Bung Cau village (Song Be prov.), Cay Gao village (Dong Nai prov.), Song Trau village (Dong Nai prov.), Thoi Long village (OMon pref., Can Tho prov.) were carried out, with taking notes through one Vietnamese interpreter, and received any samples offered by the interviewees. Chromosome number of the taxa is counted by the ordinary squashing method. The voucher specimens are kept in the Makino Herbarium, Tokyo Metropolitan University (MAK).

Local uses and Cultivation

In Vietnam a kind of noodles called "Mien" was made from the edible canna starch. Making noodle is quite general way of commercial usage of the edible canna plants in Vietnam. One of the common names of the edible canna plants is "Cu Chuoi", which means banana growing underground. The noodle made from edible canna was sometimes found at the market in Ho Chi Minh and Can Toh. There were three types of canna noodles; wholly refined one, partially refined and unrefined one. They sell them at 3000–3500 Don (1US\$=11,000 Don) per bunch (Fig. 2-A).

Bung Cau Village (Vernacular name: Cu Chuoi):

The canna cultivation for its starchy rhizomes is for their own consumption because of the meager quantity harvested. The rhizome is eaten after boiling just like the sweet potatoes. The local people sometimes make rhizomes into powder and drink after dissolving it in boiling water.

Song Trau Village (Vernacular name: Cu Giong):

According to the informant, agents from the market in Traco village located about 10 km

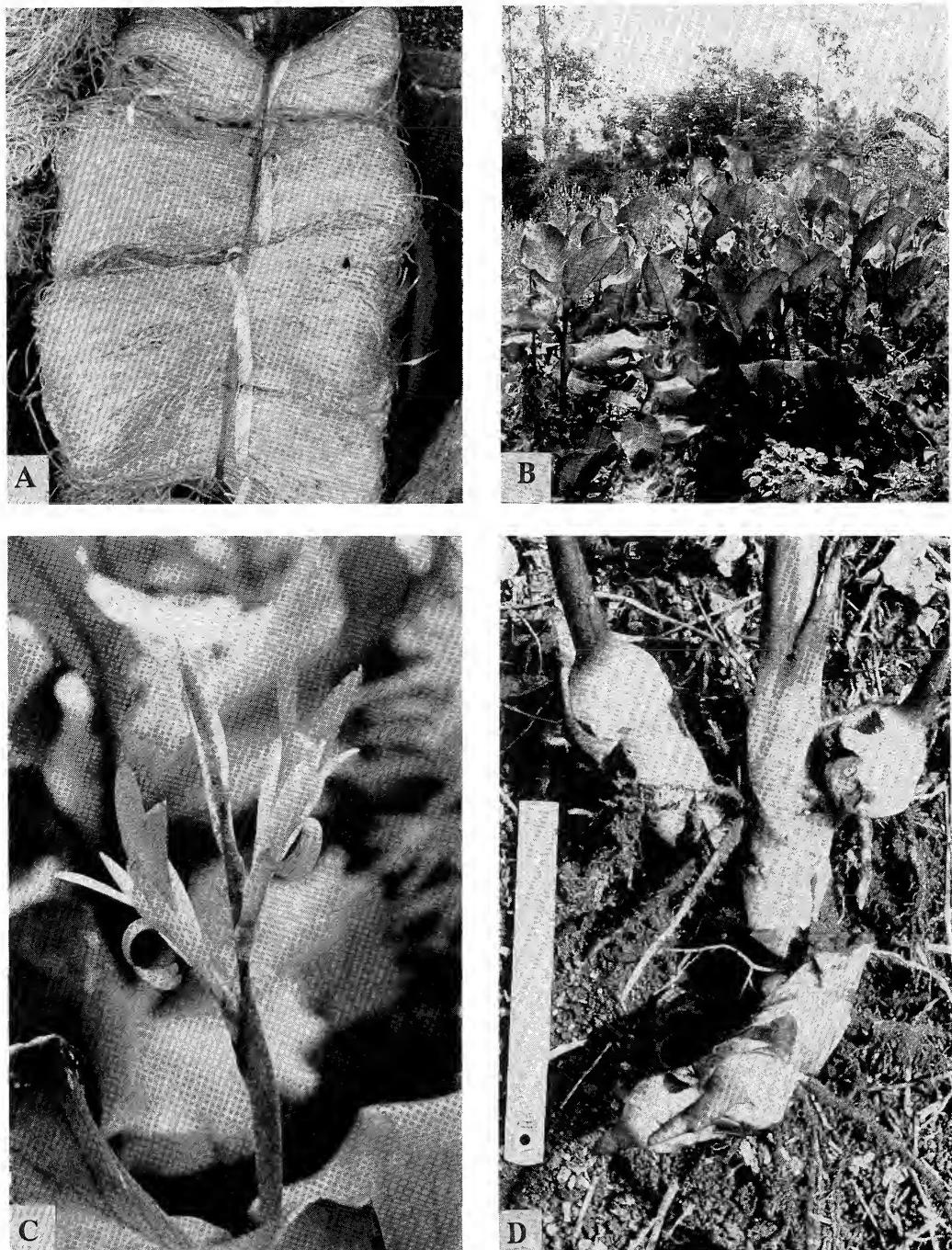


Fig. 2. Edible canna utilization and its phenology in south Vietnam. A. Noodle made from canna starch at a market in Ho Chi Minh. B. Cultivation of edible canna in Song Trau village. C. Inflorescence. D. Rhizome used to make noodles and eat after boiling.

south of this village buys up the canna rhizome at about 1500 Don per kg every December. If they would like to sell the rhizome in earlier stage, they can be sold only at 600 Don per kg in wet season due to insufficient growth. Thus the price varies with the season. They are planting edible canna at the backyard (Fig. 2-B). Growing canna rhizome seems to require fertile soil, hence the villagers need to spend money on fertilizer which can be costly. They use pig excretions as an organic fertilizer to cut cost.

Cay Gao Village (Vernacular name: Cu Giong):

According to the informant, canna cultivation is widespread in this village. Besides banana, papaya, cassava, maize and so on, about 70% of the villagers grow edible canna plants. I often saw edible canna being cultivated under the banana plants. Some are planted them at the edges of the field to make a shelter with coffee, sweet potatoes in the middle. The plants are planted with a distance of ca. 1 m between them. The informant cultivates canna plant in his field together with other crops, papaya, maize, sweet potato, banana and coffee. The edible canna plant produces accounts for 15% of the total income from above six crops.

Thoi Long Village (Vernacular name: Cu Chuoi):

One house hold in this village cultivates the edible canna plants at the garden in front of the house for the purpose of ornamental use, not for food. They do not consume the rhizome as food but sell the inflorescences at the local market around January and February in conjunction of the new year as decoration for the house.

Plant Materials

The edible canna which I found in south Vietnam has the following characteristics. The inflorescence and rhizome of the plant are shown in Figs. 2-C and 2-D. As a result of

chromosome counts, it is triploid with $2n=27$.

The most previous treatments of edible canna cultivated in Asia commonly attributed to *Canna edulis* Ker Gawl. As a result of the present field investigation and herbarium work at the Natural History Museum (BM), however, the edible canna plants in south Vietnam is *Canna discolor* Lindl. in Botanical Register t.1231 which was first described from England based on the material sent from the Botanical Garden, Trinidad, by Sir Ralph Woodford, not coinciding at all with *C. edulis* Ker Gawl. though it has been so identified for a long time. Although *C. discolor* Lindl. has recently been recognized by Maas (1988) as a synonym of *C. indica* L., it is distinctly separable from the latter in its chromosome number, high sterility, larger dimension of flowers, enlarged and thickened rhizomes, and vinous-red-margined leaves (Tanaka 1998). Rigorous taxonomical identification of the plant cannot be completed without a through taxonomic revision of the New World taxa of this group, on which earlier binomials were based. This taxonomic study is underway by the present author.

Canna discolor Lindl. in Bot. Reg. t. 1231 (1829); Dietr., Syn. pl. 1: 13 (1839); Bouché in Linnaea 8: 157 (1833), 18: 492 (1844); Petersen in Fl. Bras. 3, 3(3): 73 (1890); Baker in Gard. Chron. 1: 196 (1893); Kränzlin in Engler, Pflanzenr. 56 (IV. 47): 38 (1912); Standley & Steyermark in Fieldiana Bot. 24: 203 (1952).

Voucher specimens: VIETNAM, Song Be Prov., N. Tanaka 2220 (MAK). Dong Nai Prov., N. Tanaka 2229 (SING).

Discussion

Judging from the present field investigations, as also mentioned by Imai et al. (1993), edible canna requires good soil to get a good rhizome and is not a low nutrient-requiring crop. However, the property of edible canna is soil conservative due to its rapid leaf growth to cover ground surface. *Canna* starch, as seen by

the naked eye, is a white powder, having a peculiar satiny or glistening appearance on account of the large size of its constituent granules (Bentley and Trimen 1876). The starch of canna plant is easily digested, soluble in water and is an excellent invalid or infant food (Burkhill 1985).

Recent social and economic changes are causing the society to be less dependent on its environment, leading to a rapid and irreversible loss of the minor crops which have potential for the plant resources in the future. The world food production is not enough to sustain the present world population (Inatsu et al. 1989). From this point of view, immediate conservation of plant genetic resources such like edible canna plants is essential for our future.

As pointed out by Woodson (1945), dried and pressed canna specimens do not give a good idea of the characteristic of the plant, and most specimens are not accompanied by the data required. Thus it is very difficult to do taxonomical work on Cannaceae from the data of specimens. Since the edible canna plants are diversified in the New World, their crop improvement requires further systematic research and germplasm inventory of Central and South American plants.

Field research was supported by the Overseas Scholarship of Graduate School of Nihon University. I am very grateful to Prof. Tetsuo Koyama, Prof. Kazuo Yoneda and Dr. Hiroshi Uchiyama for their guidance. Thanks are also given to Mr. Bui Van Ba for his translation work. While I got my working place at the Department of Botany, the National University of Singapore, Dr. I. M. Turner so gener-

ously gave me every facility to carry out this project. I acknowledge Dr. L. C. Kiet and Mr. Nguyen Thien Tich for providing me with the information on *Canna* cultivation of south Vietnam.

References

- Bentley R. and Trimen H. 1876. Medicinal Plants 4: t. 266. London.
- Bird J. 1948. Preceramic cultures in Chicama and Viru. In: A reappraisal of Peruvian archaeology. Mem. Soc. Amer. Archaeol. 4: 24.
- Burkhill H. M. 1985. The useful plants of west tropical Africa ed. 2. 1: 313–315. Royal Botanic Gardens, Kew.
- Duck J. A. and Vasquez R. 1994. Amazonian ethnobotanical dictionary. CRC Press, Boca Raton.
- Gade D. W. 1966. Achira, the edible canna, its cultivation and use in the Peruvian Andes. Economic Botany 20: 407–415.
- Imai K. et al. 1993. Studies on matter production of edible Canna II. Changes of dry matter production with growth. Jpn. J. Crop. Sci. 62(4): 601–608.
- Inatsu O. et al. 1983. Edible Canna starch. I. Jpn. Soc. Starch Sci. 30: 38–47.
- Maas P. J. 1988. Cannaceae. Flora of Ecuador, no. 32, pp. 3–9.
- Morton J. F. 1981. Atlas of medicinal plants of Middle America Bahamas to Yucatan, pp. 111–112.
- National Research Council 1989. Lost crops of the Incas. Little-known plants of the Andes with promise for worldwide cultivation, pp. 27–37. National Academy Press, Washington, D.C.
- Ochse J. J., Bakhuizen van Den Brink R. C. 1971. Vegetables of the Dutch East Indies, pp. 95–96. A. Asher & Co. B.V., Amsterdam.
- Purseglove J. W. 1972. Tropical crops Monocotyledons, pp. 92–93. Longman Group Limited, London.
- Tanaka N. 1998. On the genus *Canna* in Yaeyama Islands, the Ryukyu, Japan. J. Jpn. Bot. 73: 165–169.
- Ugent D. et al. 1984. New evidence for ancient cultivation of *Canna edulis* in Peru. Economic Botany 38(4): 417–432.
- Woodson R. E. 1945. Cannaceae in flora of Panama. Ann. Missouri Bot. Gard. 32: 74–80.

田中伸幸：ベトナム南部における食用カンナの資源植物学的研究

カンナ科の数種は古くはアンデス地域のインカ族がその根茎を澱粉食として利用していた歴史をもつ。現在では汎世界的に熱帯、亜熱帯地域に伝播し、熱帯アジア地域でも自給的あるいは商業的に利用が見られるが、その分類、特性に関する調査研究は殆どなく、その必要性が指摘されていた。筆者はシンガポール大学植物学科に在籍中、東南アジアにおける食用カンナの利用、分類の調査を行った。本稿では、そのうち、食用カンナの利用の割合の高かったベトナムにおいて南部を中心として行った簡単な資源植物学的研究の結果を報告する。ベトナム南部では調査地の全てで1種の食用カンナが利用されており、根茎を茹でて食用に供し

ているほか、澱粉にしてそれを湯に溶き、葛湯様に飲用する。また、澱粉を麺に加工して市場で販売するという商業的な利用がみられた。この食用カンナは従来あてられていた *Canna edulis* Ker Gawl. ではなく、むしろ *C. discolor* Lind. に一致した。*C. discolor* は *C. indica* L. とは異なり、きわめて根茎が腕状に肥大する有用種であった。将来的な熱帯地域での澱粉源植物としての食用カンナの開発研究のためにはカンナ科の分類体系の確立が不可欠であり、熱帯アメリカ地域でのさらなる遺伝子資源探索が必要である。

(東京都立大学大学院理学研究科牧野標本館)